

## LIST OF CLAIMS / AMENDMENTS

**Claims pending:** Claims 1, 3-39, and 41-57

**Canceled or Withdrawn claims:** Claims 2, and 40

**Amended claims:** Claims 1, 20, 21-28, 37-39, 46-47, 49, and 54

**Previously Presented:** Claim 45

**New claims:** None.

1. **(Currently Amended)** A method performed by a control client that communicates with a load-balancing cluster of server nodes configured to service application-layer requests sent by user clients to a virtual address common to the cluster, the method comprising:

dynamically determining, by the control client, which server nodes are members of the ~~present members of a load-balancing cluster;~~ which includes nodes and a node manager; and

monitoring application-layer availability of one or more members of the server nodes in the load-balancing cluster, the monitoring being performed by one or more clients ~~the control client generating and sending, from outside of the load-balancing cluster application-layer, requests to those server nodes determined to be members of the load-balancing cluster; and~~

in accordance with the application-layer availability of a server node in the load-balancing cluster as determined by the application-layer monitoring of the control client, sending to the load-balancing cluster a message that is configured to control whether the server node handles application-layer requests sent to the load-

1 balancing cluster by the user clients, where the application-layer requests sent by  
2 the control client to monitor application-layer availability conform to a same  
3 application-layer protocol that the user client requests conform to.

4  
5 **2. (Canceled)**

6  
7 **3. (Original)** A method as recited in claim 1 further comprising  
8 exocusterly and selectively deactivating one or more active members of the  
9 cluster.

10  
11 **4. (Original)** A method as recited in claim 1 further comprising,  
12 based upon the monitoring, identifying one or more active members of the cluster  
13 that are presently overwhelmed at the application-layer.

14  
15 **5. (Original)** A method as recited in claim 1 further comprising:  
16 based upon the monitoring, identifying one or more active members of the  
17 cluster that are presently overwhelmed at the application-layer;  
18 exocusterly deactivating one or more members identified by the  
19 identifying.

20  
21 **6. (Original)** A method as recited in claim 1 further comprising  
22 exocusterly and selectively activating one or more inactive members of the  
23 cluster.  
24  
25

1           7.     **(Original)**   A method as recited in claim 1 further comprising,  
2 based upon the monitoring, identifying one or more inactive members of the  
3 cluster that are not presently overwhelmed at the application-layer.

4  
5           8.     **(Original)**   A method as recited in claim 1 further comprising:  
6 based upon the monitoring, identifying one or more inactive members of  
7 the cluster that are not presently overwhelmed at the application-layer;  
8 exocusterly activating one or more members identified by the identifying.

9  
10          9.     **(Original)**   A method as recited in claim 1 further comprising:  
11 based upon the monitoring, identifying one or more active members of the  
12 cluster that are presently overwhelmed at the application-layer and identifying one  
13 or more inactive members of the cluster that are not presently overwhelmed at the  
14 application-layer;  
15 exocusterly deactivating one or more active members identified by the  
16 identifying;  
17 exocusterly activating one or more inactive members identified by the  
18 identifying.

19  
20          10.    **(Original)**   A method as recited in claim 1 further comprising  
21 determining a present activity state of members of the cluster.

22  
23          11.    **(Original)**   A method as recited in claim 1 further comprising:  
24 determining a present activity state of members of the cluster;  
25

1 tracking and persisting the activity states of the members of the cluster.

2  
3 **12. (Original)** A method as recited in claim 11, wherein the activity  
4 states include cluster states.

5  
6 **13. (Original)** A method as recited in claim 11 further comprising  
7 reporting a present activity state of one or more members of the cluster.

8  
9 **14. (Original)** A method as recited in claim 11 further comprising  
10 reporting historical record of the activity states of one or more members of the  
11 cluster.

12  
13 **15. (Original)** A method as recited in claim 11 further comprising  
14 reporting a present application-layer state of one or more members of the cluster.

15  
16 **16. (Original)** A method as recited in claim 11 further comprising  
17 reporting historical record of the application-layer states of one or more members  
18 of the cluster.

19  
20 **17. (Original)** A method as recited in claim 1, wherein the  
21 monitoring comprises monitoring in one or more different application-layer  
22 protocols.

1       **18. (Original)** A method as recited in claim 1, further comprises,  
2 based upon the monitoring, determining the application-layer availability of one or  
3 more members based upon an indicator of such availability, the indicator sent  
4 from a member being monitored.

5  
6       **19. (Original)** A method as recited in claim 1, further comprises:  
7 based upon the monitoring, determining the application-layer availability of  
8 one or more members based upon a indicator of such availability, the indicator  
9 sent from a member being monitored;  
10 the member being monitored determining such availability and generating  
11 such indicator.

12  
13       **20. (Currently Amended)** A tangible computer-readable medium  
14 having computer-executable instructions that, when executed by a computer,  
15 perform the method as recited in claim 1.

16  
17       **21. (Currently Amended)** A method performed by a control client  
18 that communicates with a load-balancing cluster of server nodes configured to  
19 service application-layer requests sent by user clients to a virtual address common  
20 to the cluster, the method comprising:

21 monitoring application-layer availability of the server nodes in the  
22 ~~members of a load-balancing cluster which includes nodes and a node manager,~~  
23 the monitoring being performed by ~~one or more clients~~ the control client  
24 generating and sending, from outside of the load-balancing cluster application-  
25

1 layer, requests to those server nodes determined to be members of the load-  
2 balancing cluster; and

3 ~~exocusterly controlling activity state of the members of the cluster.~~

4 in accordance with the application-layer availability of a server node in the  
5 load-balancing cluster as determined by the application-layer monitoring of the  
6 control client, sending to the load-balancing cluster a message that is configured to  
7 control whether the server node handles application-layer requests sent to the load-  
8 balancing cluster by the user clients, where the application-layer requests sent by  
9 the control client to monitor application-layer availability conform to a same  
10 application-layer protocol that the user client requests conform to.

11  
12 **22. (Currently Amended)** A method as recited in claim 21, wherein  
13 the ~~controlling~~ monitoring comprises selectively deactivating one or more active  
14 members of the cluster.

15  
16 **23. (Currently Amended)** A method as recited in claim 21, wherein  
17 the ~~controlling~~ monitoring comprises, based upon the monitoring, identifying one  
18 or more active members of the cluster that are presently overwhelmed at the  
19 application-layer.

20  
21 **24. (Currently Amended)** A method as recited in claim 21, wherein  
22 the ~~controlling~~ monitoring comprises:

23 based upon the monitoring, identifying one or more active members of the  
24 cluster that are presently overwhelmed at the application-layer;

1 exocusterly deactivating one or more members identified by the  
2 identifying.

3  
4 **25. (Currently Amended)** A method as recited in claim 21, wherein  
5 the ~~controlling~~ monitoring comprises selectively activating one or more inactive  
6 members of the load-balancing cluster.

7  
8 **26. (Currently Amended)** A method as recited in claim 21, wherein  
9 the ~~controlling~~ monitoring comprises, based upon the monitoring, identifying one  
10 or more inactive members of the cluster that are not presently overwhelmed at the  
11 application-layer.

12  
13 **27. (Currently Amended)** A method as recited in claim 21, wherein  
14 the ~~controlling~~ monitoring comprises:

15 based upon the monitoring, identifying one or more inactive members of  
16 the cluster that are not presently overwhelmed at the application-layer;

17 exocusterly activating one or more members identified by the identifying.

18  
19 **28. (Currently Amended)** A method as recited in claim 21, wherein  
20 the ~~controlling~~ monitoring comprises:

21 based upon the monitoring, identifying one or more active members of the  
22 cluster that are presently overwhelmed at the application-layer and identifying one  
23 or more inactive members of the cluster that are not presently overwhelmed at the  
24 application-layer;

1           exocusterly deactivating one or more active members identified by the  
2 identifying;

3           exocusterly activating one or more inactive members identified by the  
4 identifying.

5  
6           **29. (Original)** A method as recited in claim 21 further comprising  
7 determining a present activity state of the members of the cluster.

8  
9           **30. (Original)** A method as recited in claim 21 further comprising:  
10 determining a present activity state of the members of the cluster;  
11 tracking and persisting the activity states of the members of the cluster.

12  
13           **31. (Original)** A method as recited in claim 30, wherein the activity  
14 state includes a cluster state.

15  
16           **32. (Original)** A method as recited in claim 30 further comprising  
17 reporting a present activity state of one or more members of the cluster.

18  
19           **33. (Original)** A method as recited in claim 30 further comprising  
20 reporting historical record of the activity states of one or more members of the  
21 cluster.

22  
23           **34. (Original)** A method as recited in claim 30 further comprising  
24 reporting a present application-layer state of one or more members of the cluster.  
25



1  
2       **35. (Original)** A method as recited in claim 30 further comprising  
3 reporting historical record of the application-layer states of one or more members  
4 of the cluster.

5  
6       **36. (Original)** A method as recited in claim 21, wherein the  
7 monitoring comprises monitoring in one or more different application-layer  
8 protocols.

9  
10       **37. (Currently Amended)** A tangible computer-readable medium  
11 having computer-executable instructions that, when executed by a computer,  
12 performs the method as recited in claim 21.

13  
14       **38. (Currently Amended)** A tangible computer-readable medium  
15 having computer-executable instructions that, when executed by a computer,  
16 perform a method performed by a control client that communicates with a load-  
17 balancing cluster of server nodes configured to service application-layer requests  
18 sent by user clients to a virtual address common to the cluster, the method  
19 comprising:

20       dynamically determining, by the control client, which server nodes are  
21 members of the present members of a load-balancing cluster; which includes  
22 nodes and a node manager and an activity state of each member;

23       monitoring application-layer availability ~~of the one or more members of the~~  
24 server nodes in the load-balancing cluster, the monitoring being performed by the  
25

1 control client generating and sending, from outside of the load-balancing cluster  
2 application-layer, requests to those server nodes determined to be members of the  
3 load-balancing cluster; and

4 ~~as such availability is observed by the computer outside of the cluster which is~~  
5 ~~communicatively linked to the node manager in the cluster, such that the~~  
6 ~~monitoring is from a client perspective to detect an error that may impact the~~  
7 ~~application-layer availability as it appears to the computer from outside of the~~  
8 ~~cluster; and~~

9 ~~exocusterly controlling the activity state of the members of the cluster.~~

10 in accordance with the application-layer availability of a server node  
11 in the load-balancing cluster as determined by the application-layer monitoring of  
12 the control client, sending to the load-balancing cluster a message that is  
13 configured to control whether the server node handles application-layer requests  
14 sent to the load-balancing cluster by the user clients, where the application-layer  
15 requests sent by the control client to monitor application-layer availability  
16 conform to a same application-layer protocol that the user client requests conform  
17 to.

18  
19 **39. (Currently Amended)** A system comprising:

20 a control client that communicates with a load-balancing cluster of server  
21 nodes configured to service application-layer requests sent by user clients to a  
22 virtual address common to the cluster;

23 a dynamic cluster-membership determiner configured to exocusterly and  
24 dynamically determine, by the control client, which server nodes are members of  
25

1 ~~the present members of a load-balancing cluster; which includes nodes and a node~~  
2 ~~manager; and~~

3 an exocuster monitor configured to monitor application-layer availability  
4 ~~of the present members of the server nodes in the load-balancing cluster, the~~  
5 ~~monitoring being performed by the control client generating and sending, from~~  
6 ~~outside of the load-balancing cluster application-layer, requests to those server~~  
7 ~~nodes determined to be members of the load-balancing cluster; and~~  
8 ~~the exocuster monitor distributed across one or more clients outside of the cluster~~  
9 ~~which are communicatively linked to the node manager in the cluster, such that~~  
10 ~~monitoring is from a client perspective to detect an error that may impact the~~  
11 ~~application-layer availability as it appears to the one or more clients from outside~~  
12 ~~of the cluster.~~

13 in accordance with the application-layer availability of a server node in the  
14 load-balancing cluster as determined by the application-layer monitoring of the  
15 control client, sending to the load-balancing cluster a message that is configured to  
16 control whether the server node handles application-layer requests sent to the load-  
17 balancing cluster by the user clients, where the application-layer requests sent by  
18 the control client to monitor application-layer availability conform to a same  
19 application-layer protocol that the user client requests conform to.

20  
21 **40. (Cancelled)**

22  
23 **41. (Original)** A system as recited in claim 39 further comprising an  
24 overload-identifier configured to identify, based upon the monitored availability,  
25

1 one or more active members of the cluster that are presently overwhelmed at the  
2 application-layer.

3  
4 **42. (Original)** A system as recited in claim 39 further comprising an  
5 overload-identifier configured to identify, based upon the monitored availability,  
6 one or more inactive members of the cluster that are not presently overwhelmed at  
7 the application-layer.

8  
9 **43. (Original)** A system as recited in claim 39 further comprising a  
10 state-determiner configured to determine a present activity state of members of the  
11 cluster.

12  
13 **44. (Original)** A system as recited in claim 39 further comprising:  
14 a state-determiner configured to determine a present activity state of  
15 members of the cluster;  
16 a database configured to store the activity states of the members of the  
17 cluster.

18  
19 **45. (Previously Presented)** A system as recited in claim 39, wherein  
20 the exocluster monitor is protocol agnostic.  
21  
22  
23  
24  
25

1       **46. (Currently Amended)**     A system comprising:

2       a control client that communicates with a load-balancing cluster of server  
3 nodes configured to service application-layer requests sent by user clients to a  
4 virtual address common to the cluster;

5       an exocluster monitor configured to monitor application-layer availability  
6 of ~~members of a~~ the server nodes in the load-balancing cluster which includes  
7 ~~nodes and a node manager,~~ the monitoring being performed by the control client  
8 generating and sending, from outside of the load-balancing cluster application-  
9 layer, requests to those server nodes determined to be members of the load-  
10 balancing cluster; and

11 ~~the exocluster monitor distributed across one or more clients outside of the cluster~~  
12 ~~which are communicatively linked to the node manager in the cluster, such that~~  
13 ~~monitoring is from a client perspective to detect an error that may impact the~~  
14 ~~application-layer availability as it appears to the one or more clients from outside~~  
15 ~~of the cluster; and~~

16       in accordance with the application-layer availability of a server node in the  
17 load-balancing cluster as determined by the application-layer monitoring of the  
18 control client, sending to the load-balancing cluster a message that is configured to  
19 control whether the server node handles application-layer requests sent to the load-  
20 balancing cluster by the user clients, where the application-layer requests sent by  
21 the control client to monitor application-layer availability conform to a same  
22 application-layer protocol that the user client requests conform to.

23       ~~an exocluster controller configured to control an activity state of members~~  
24 ~~of the cluster.~~

1  
2       **47. (Currently Amended)**   A system as recited in claim 46, wherein  
3 the exocluster ~~controller~~ monitor is further configured to exocusterly and  
4 selectively deactivate one or more active members of the cluster.

5  
6       **48. (Original)**   A system as recited in claim 46 further comprising an  
7 overload-identifier configured to identify, based upon the monitored availability,  
8 one or more active members of the cluster that are presently overwhelmed at the  
9 application-layer.

10  
11       **49. (Currently Amended)**   A system as recited in claim 46, wherein  
12 the exocluster ~~controller~~ monitor is further configured to exocusterly and  
13 selectively activate one or more inactive members of the cluster.

14  
15       **50. (Original)**   A system as recited in claim 46 further comprising an  
16 overload-identifier configured to identify, based upon the monitored availability,  
17 one or more inactive members of the cluster that are not presently overwhelmed at  
18 the application-layer.

19  
20       **51. (Original)**   A system as recited in claim 46 further comprising a  
21 state-determiner configured to determine a present activity state of the members of  
22 the cluster.  
23  
24  
25

1           **52. (Original)** A system as recited in claim 46 further comprising:  
2           a state-determiner configured to determine a present activity state of the  
3           members of the cluster;

4           a database configured to store the activity states of the members of the  
5           cluster.

6  
7           **53. (Original)** A system as recited in claim 46, wherein the monitor is  
8           protocol agnostic.

9  
10          **54. (Currently Amended)** A dynamic, active, exocuster monitoring  
11          system for monitoring application-layer availability of ~~members of~~ server nodes in  
12          a load-balancing cluster and for controlling an activity state of such ~~members~~  
13          server nodes, the monitoring system comprising:

14          a control client that communicates with a load-balancing cluster of server  
15          nodes configured to service application-layer requests sent by user clients to a  
16          virtual address common to the cluster;

17          an app-monitor configured to exocusterly monitor application-layer  
18          availability of the server nodes in the load-balancing cluster, the monitoring being  
19          performed by the control client generating and sending, from outside of the load-  
20          balancing cluster application-layer, requests to those server nodes determined to  
21          be members of the load-balancing cluster; and ~~the members of the cluster which~~  
22          ~~includes nodes and a node manager, the app-monitor distributed across one or~~  
23          ~~more clients outside of the cluster which are communicatively linked to the node~~  
24          ~~manager in the cluster, such that monitoring is from a client perspective to detect~~  
25

1 an error that may impact the application-layer availability as it appears to the one  
2 or more clients from outside of the cluster;

3 in accordance with the application-layer availability of a server node in the  
4 load-balancing cluster as determined by the application-layer monitoring of the  
5 control client, sending to the load-balancing cluster a message that is configured to  
6 control whether the server node handles application-layer requests sent to the load-  
7 balancing cluster by the user clients, where the application-layer requests sent by  
8 the control client to monitor application-layer availability conform to a same  
9 application-layer protocol that the user client requests conform to.

10 ~~a cluster-control configured to exocusterly determine the activity state of~~  
11 ~~the members of the cluster and to exocusterly control the activity state of the~~  
12 ~~members of the cluster; and~~

13 ~~a central-controller configured to coordinate and control the app-monitor~~  
14 ~~and the cluster-control.~~

15  
16 **55. (Original)** A system as recited in claim 54 further comprising a  
17 database configured to store state change information, including cluster state and  
18 application-layer state.

19  
20 **56. (Original)** A system as recited in claim 54 further comprising  
21 multiple app-monitors.

22  
23 **57. (Original)** A system as recited in claim 54 further comprising  
24 multiple cluster-controls.